# PATENT COOPERATION TREATY

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## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

| Applicant's or agent's file reference P016320WO | FOR FURTHER ACTION | See Form PCT/IPEA/416 |
|---|---|---|
| International application No. PCT/GB2004/001011 | International filing date *(day/month/year)* 08.03.2004 | Priority date *(day/month/year)* 17.03.2003 |
| International Patent Classification (IPC) or national classification and IPC H04L12/56 | | |
| Applicant ORANGE SA et al | | |

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 15 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☒ *sent to the applicant and to the International Bureau)* a total of 14 sheets, as follows:
      ☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

| | | |
|---|---|---|
| ☒ | Box No. I | Basis of the opinion |
| ☐ | Box No. II | Priority |
| ☒ | Box No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability |
| ☐ | Box No. IV | Lack of unity of invention |
| ☒ | Box No. V | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| ☐ | Box No. VI | Certain documents cited |
| ☒ | Box No. VII | Certain defects in the international application |
| ☒ | Box No. VIII | Certain observations on the international application |

| Date of submission of the demand | Date of completion of this report |
|---|---|
| 12.10.2004 | 01.07.2005 |
| Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465 | Authorized Officer García Bolos, R Telephone No. +49 89 2399-7110 |

# INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/GB2004/001011

## Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

   ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:

   ☐ international search (under Rules 12.3 and 23.1(b))
   ☐ publication of the international application (under Rule 12.4)
   ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

| **Description, Pages** | |
|---|---|
| 1, 5-12, 14-25 | as originally filed |
| 2, 4, 13, 26 | received on 12.10.2004 with letter of 07.10.2004 |
| 3 | received on 24.01.2005 with letter of 20.01.2005 |
| **Claims, Numbers** | |
| 1-19 | received on 24.01.2005 with letter of 20.01.2005 |
| **Drawings, Sheets** | |
| 1/17-3/17, 5/17-13/17, 15/17-17/17 | as originally filed |
| 4/17, 14/17 | received on 12.10.2004 with letter of 07.10.2004 |

☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:
   ☐ the description, pages
   ☐ the claims, Nos.
   ☐ the drawings, sheets/figs
   ☐ the sequence listing *(specify)*:
   ☐ any table(s) related to sequence listing *(specify)*:

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
   ☐ the description, pages
   ☐ the claims, Nos.
   ☐ the drawings, sheets/figs
   ☐ the sequence listing *(specify)*:
   ☐ any table(s) related to sequence listing *(specify)*:

* *If item 4 applies, some or all of these sheets may be marked "superseded."*

# INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/GB2004/001011

**Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability**

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

☐ the entire international application,

☒ claims Nos. 18 and 19

because:

☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (specify):

☒ the description, claims or drawings *(indicate particular elements below)* or said claims Nos. 18 and 19 are so unclear that no meaningful opinion could be formed *(specify)*:

**see separate sheet**

☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.

☐ no international search report has been established for the said claims Nos.

☐ the nucleotide and/or amino acid sequence listing does not comply with the standard provided for in Annex C of the Administrative Instructions in that:

the written form ☐ has not been furnished

☐ does not comply with the standard

the computer readable form ☐ has not been furnished

☐ does not comply with the standard

☐ the tables related to the nucleotide and/or amino acid sequence listing, if in computer readable form only, do not comply with the technical requirements provided for in Annex C-*bis* of the Administrative Instructions.

☒ See separate sheet for further details

# INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/GB2004/001011

## Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

| | | | |
|---|---|---|---|
| Novelty (N) | Yes: | Claims | 4, 6 to 10 and 13 to 16 |
| | No: | Claims | 1, 2, 3, 5, 11, 12 and 17 |
| Inventive step (IS) | Yes: | Claims | |
| | No: | Claims | 1 to 17 |
| Industrial applicability (IA) | Yes: | Claims | 1 to 17 |
| | No: | Claims | |

2. Citations and explanations (Rule 70.7):

**see separate sheet**

## Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

**see separate sheet**

## Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

**see separate sheet**

## Section III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

Claims 18 and 19 do not meet the requirements of Rule 6.2 PCT because these claims as a whole rely on references to the drawings in respect of their technical features.

**Therefore, no examination of claims 18 and 19 is possible and claims 18 and 19 are thus not allowable, Rule 6.2 PCT .**

## Section V. Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability

### 1. Documents referred to in this communication

The following documents are referred to in this communication; the numbering will be adhered to in the rest of the procedure:

D1: EP-A-1 096 742 (LUCENT TECHNOLOGIES INC) 2 May 2001 (2001-05-02)

D2: WO 99/16266 A (ERICSSON TELEFON AB L M) 1 April 1999 (1999-04-01)

D3: WO 02/098077 A (ERICSSON TELEFON AB L M) 5 December 2002 (2002-12-05)

### 2. Article 33 PCT

### 2.1 Independent claims 1, 6, 11, 13 to 15 and 17

After a careful consideration of the observations set out in the applicant's letter of 20 January 2005, the examiner is of the opinion that the subject-matter of claims 1, 6, 11, 13 to 15 and 17 is not novel or does not involve an inventive step, Articles 33.2 and 33.3 PCT.

### 2.1.1 Claim 11 in the light of Article 33.2 PCT

The subject-matter of claim 11 is not novel over the disclosure of document D1, because according to all the features of claim 11, D1 discloses (applying the terminology of present claim 11 and the references of D1):

A serving support node (SGSN, column 11, paragraphs 53, 55 and 57; figure 1) of a packet radio network for communicating internet packets to and/or from a mobile communications user equipment, the internet packets including a header and payload data, wherein the payload data includes a plurality of different types of data, the serving support node comprising:

an internet protocol communications layer (column 8, paragraphs 31 and 33) and

a user data tunnelling layer (column 8, paragraphs 31 to 33) operable to provide a virtual channel for communicating user data between the mobile user equipment and a gateway support node of the packet radio network, wherein the serving support node is operable in combination with the gateway support node to response to context application request data from the mobile user equipment,

to establish (figure 1; column 5, line 47 to column 7, line 48) the virtual channel between the gateway support node and the user equipment via the serving support node for communicating the internet packets, and

in response to the context application request data including a data field representing main set of quality of service parameters and at least one other data field representing a request for a different set of quality of service parameters, each set of quality of service parameters being required for one of the different types of data in the internet packets (column 3, paragraph 9 and column 4, paragraph 18 to column 9, paragraph 20)

to establish (figure 1; column 5, line 47 to column 7, line 48; column 6, lines 45 to 57; column 11, paragraph 55 to column 12, paragraph 58) a plurality of radio access bearers in accordance with one of the sets of the quality of service

parameters, each radio access bearer being provided for one of the different types.

Moreover, the subject-matter of claim 11 is not novel over the disclosure of document D2 (see page 3, line 6 to page 18, line 16; figures 2 to 7, 3, 4, 5 and 6).

**Therefore, the subject-matter of claim 11 is not novel, Article 33.2 PCT.**

### 2.1.2 Claim 1 in the light of Article 33.2 PCT

The subject-matter of claim 1 is not novel over the disclosure of document D1, because according to all the features of claim 1, D1 discloses (applying the terminology of present claim 1 and the references of D1):

A telecommunications system for providing a facility for communicating internet packets to and/or from a mobile user equipment, payload data of the internet packets comprising a plurality of different types of data, the system comprising a packet radio network which includes a gateway support node, a serving support node and a radio network controller (columns 10, 11 and 12, paragraphs 52 to 53, and 57 to 58; figure 1),

the gateway support node (GGSN, column 7, lines 28 to 31 and column 8, lines 11 to 13; figure 1) being operable to provide an interface for communicating the internet packets between the user equipment and the packet data network,

the serving support node (SGSN, column 11, paragraphs 53, 55 and 57; figure 1) being operable to control communication of the internet packets between the gateway support node and the mobile user equipment using a radio network controller, the radio network controller (column 6, lines 45 to 57; figure 1) being operable to provide radio access bearers for communicating the internet packets to and from the user equipment, wherein

the gateway support node in combination with the serving support node are operable in response to context application request data from the mobile user equipment to establish (figure 1; column 5, line 47 to column 7, line 48) a virtual

communications channel between the gateway support node and the user equipment via the serving support node, the context request data (Multi-Service Activate PDP context Request; column 4, paragraph 18; paragraphs 27 to 28; figure 1) representing a request for the virtual communications channel for communicating the internet packets containing different types of data, the context application request data specifying a main set of quality of service parameters and including at least one other data field representing a request for a different set of quality of service parameters, each set of quality of service parameters being provided for one of the different types of data in the internet packet, the virtual communications channel including a bearer for communicating the internet packets between the gateway support node and the serving support node (column 4, paragraph 18 to column 5, paragraph 20; column 6, lines 45 to 57; column 8, paragraph 31; column 10, paragraph 50; and column 11, paragraph 55) and a plurality of radio access bearers, each of the radio access bearers being provided for one of the different types of payload data of the internet packets, each radio access bearer providing one of the main and other set of quality of service parameters for the different data types specified by the context application request data.

Moreover, the subject-matter of claim 1 is not novel over the disclosure of document D2 (see page 3, line 6 to page 18, line 16; figures 2 to 7, 3, 4, 5 and 6).

**Therefore, the subject-matter of claim 1 is not novel, Article 33.2 PCT.**

### 2.1.3 Claim 17 in the light of Article 33.2 PCT

The considerations in paragraph 2.1.2 concerning claim 1 are also valid for independent claim 17 because all the features of claim 17 are features of claim 1.

**The subject-matter of claim 17 is thus not novel, Article 33.2 PCT.**

### 2.1.4 Claims 1, 11 and 17 in the light of Article 33.3 PCT

It is furthermore noted that even if the applicant would interpret the disclosure of document D1 or D2 in a slightly different manner than the examiner has done in the above analysis, and based on his interpretations would come to the conclusion that there are differences between the subject-matter of present claims 1, 11 or 17 and D1 or D2 which would then establish novelty, then these differences, even if they could be acknowledged as such, would only be of so minor nature that they could not be the basis for establishing the presence of any inventive step, Article 33.3 PCT, as D1 or D2 discloses the same object and the same type of solution as the present application.

### 2.1.5 Claim 14 in the light of Article 33.3 PCT

According to the essential features of claim 14, document D1 which is considered to represent the most relevant state of the art, discloses (applying the terminology of present claim 14 and the references of D1):

> A mobile user equipment (mobile station MS, column 3, paragraph 9,) for communicating internet packets, payload data of the internet packets data comprising a plurality of different types of data, the user equipment being operable to communicate context application request data (Multi-Service Activate PDP context Request; column 4, paragraph 18; column 5, paragraph 27 to column 6, paragraph 28, line 29; figure 1) to a serving support node (SGSN; figure 1), the context request data representing a request for a virtual communications channel for communicating the internet data packets containing the different types of data, wherein the request data includes a data field specifying a main set of quality of service parameters and at least one other data field representing a request for at least one other radio access bearer providing a different quality of service parameters, each of the radio access bearers provided for one of the different types of data in the internet packets (column 10, paragraph 50; column 11, paragraph 55).

The subject-matter of claim 14 differs from that disclosed in D1 only in the application of packets, the payload of each of them including a plurality of different types of data

instead of applying packets, each one of them belonging to one of a plurality of quality of service sets.

However, this feature has already been employed, as for example in D3 (page 12, lines 3 to 12; figure 7; page 13, lines 1 to 17; figure 9; page 14, lines 3 to 14; figure 11; page 15, lines 8 to page 19, line 9), in packet radio networks with mobile user equipments requiring multiple quality of service sets for the same application as in D1 (see D1, column 2, paragraph 8, line 55 and D3, page 6, line 13).

It appears to be obvious to a person skilled in the art, namely when the same result is to be achieved, to apply this feature with corresponding effect to the apparatus of D1 and thus to arrive at an apparatus according to claim 14.

**Therefore, subject-matter of claim 14 does not involve an inventive step, Article 33.3 PCT.**

### 2.1.6 Claim 6 in the light of Article 33.3 PCT

Claim 6 discloses additional features to the corresponding ones of claim 14 in the category method. These additional features are also disclosed in D1:

communicating internet packet data to and/or from a mobile user equipment via a packet radio network, the packet radio network including a gateway support node, a serving support node and a radio network controller (columns 10, 11 and 12, paragraphs 52 to 53, and 57 to 58; figure 1),

using the serving support node (SGSN, column 11, paragraphs 53, 55 and 57; figure 1) of the packet radio network to control the communication of the internet packets between the gateway support node and the mobile user equipment using the radio network controller, the radio network controller (column 6, lines 45 to 57; figure 1) being operable to provide radio access bearers for communicating the internet packets to and from the user equipment, wherein

establishing the virtual communications channel between the gateway support

node and the user equipment in response to the context application request data for communicating the internet packet data (Steps 3 and 4 in figure 1 and in the description, column 6, line 25 to column 7, line 48),

including establishing a plurality of radio access bearers in accordance with each of the sets of the quality of service parameters (figure 1; column 5, paragraph 20; column 6, lines 45 to 57; column 10, paragraph 50 and column 11, paragraph 55).

Therefore, the same inventive step reasoning as for claim 14 applies (see 2.1.5).

**The subject-matter of claim 6 is thus not inventive, Article 33.3 PCT.**

### 2.1.7 Claim 15 in the light of Article 33.3 PCT

The considerations in paragraph 2.1.6 concerning claim 6 are also valid for independent claim 15 because claim 15 contains the corresponding features of claim 6 in terms of a computer program.

**The subject-matter of claim 15 is thus not inventive, Article 33.3 PCT.**

### 2.1.8 Claim 13 in the light of Article 33.3 PCT

According to the essential features of claim 13, document D1 which is considered to represent the most relevant state of the art, discloses (applying the terminology of present claim 13 and the references of D1):

a radio network controller of a packet radio network for communicating internet packet data between a serving support node and a mobile communications user equipment (figure 1, paragraphs 57 and 58), each internet packet data carrying a plurality of different types of data, the radio network controller comprising

a radio resource layer (column 4, paragraph 18 to column 5, paragraph 20; column 6, lines 45 to 57) for controlling radio resources for communicating the internet packets,

a radio link control layer (columns 11 and 12, paragraphs 55 to 58; figures 4 to 6) for controlling a medium access control layer to provide radio access bearers for communicating the internet packets via a radio access interface to the mobile user equipment, the radio link control layer providing the radio resources controlled by the radio resource layer (column 4, paragraph 18 to column 5, paragraph 20; column 6, lines 45 to 57), wherein the radio resource layer (column 4, paragraph 18 to column 5, paragraph 20; column 6, lines 45 to 57; figure 1) is responsive to a radio access request data using a radio access network application protocol layer to control the radio link control layer to establish using the medium access control layer a main radio access bearer for one of the different types of data in accordance with a main set of quality of service parameters (column 10, paragraph 50 and columns 11 and 12, paragraphs 55 to 59; figures 4 to 6), and

to establish a radio access bearer for each of the different data types as a subflow within the main radio access bearer in the medium access control layer (column 10, paragraph 50 and columns 11 and 12, paragraphs 55 to 59; figures 4 to 6).

The subject-matter of claim 13 differs from that disclosed in D1 only in the application of packets, the payload of **each** of them including a plurality of different types of data instead of applying packets, each one of them belonging to one of a plurality of quality of service sets.

However, this feature has already been employed, as for example in D3 (page 12, lines 3 to 12; figure 7; page 13, lines 1 to 17; figure 9; page 14, lines 3 to 14; figure 11; page 15, lines 8 to page 19, line 9), in packet radio networks with mobile user equipments requiring multiple quality of service sets for the same application as in D1 (see D1, column 2, paragraph 8, line 55 and D3, page 6, line 13).

It appears to be obvious to a person skilled in the art, namely when the same result is to be achieved, to apply this feature with corresponding effect to the apparatus of D1 and thus to arrive at an apparatus according to claim 13.

**Therefore, subject-matter of claim 13 does not involve an inventive step, Article 33.3 PCT.**

**2.1.9 The applicant answered to the written opinions and failed to provide convincing arguments because the features to which the applicant refers in his arguments cannot be found in the independent claims.**

In particular, the feature of the independent claims 6, 13, 14 and 15 according to which the payload data of **each** internet packet includes a plurality of different types of data, is not included in claims 1, 11 and 17 because claims 1, 11 and 17 merely disclose that the payload data of the internet packets includes a plurality of different types of data.

Moreover, the independent claims do not specify that the internet packets which contain a plurality of different types of data each, are transmitted in transport frames each of them containing different types of data between the radio network controller and the gateway support node. However, this feature is already known e.g. from D3 (see e.g. figure 9, page 14, lines 3 to 14: "An RAB subflow is associated with a radio bearer, a QoS class or treatment and a fragmented payload"... "The RNC **splits** the Iu user plane frame into various subflows and directs the traffic to the appropriate radio bearer"; page 18, lines 1 to 3: "Table 4 illustrates a configuration of **a** speech radio access bearer"; and table 4).

**2.2 Dependent claims 2 to 5, 7 to 10, 12 and 16**

The subject-matter of the dependent claims 2 to 5, 7 to 10, 12 and 16 relates to minor design details and is either directly derivable from the above-mentioned prior art documents, or represents standard practice. These claims therefore, either alone or in combination, appear to add nothing of inventive significance to claims 1, 6, 11 and 15 respectively.

In particular, document **D1** discloses the serving support according to the features of **claims 2, 3, 5, 7, 8, 10 and 12** in the already-cited passages.

As to **claims 4 and 9**, **D3** discloses (see page 2, line 22 to page 3, line 24) the AMR feature.

**Therefore, the subject-matter of claims 2 to 5, 7 to 10, 12 and 16 is at least not inventive, Articles 33.2 and 33.3 PCT.**

**Section VII. Certain defects in the international application (form or content)**

1. Having regard to the objections expressed under section V, it is not clear what inventive contribution has been made to the art by the presently claimed subject-matter.

2. The independent claims 1, 6, 11, 13 to 15 and 17 do not meet the requirements of Rule 6.3(b) PCT because these claims are not cast in the two-part form, with those features which in combination are part of the nearest prior art document D1 being placed in the preamble. Therefore, claims 1, 6, 11, 13 to 15 and 17 are not allowable, Rule 6.3(b) PCT.

3. The claims do not include reference signs relating to the technical features referred to therein contrary to the requirements of Rule 6.2(b) PCT. The present set of claims is thus not allowable, Rule 6.2(b) PCT.

**Section VIII. Certain observations on the international application**

1. Independent claim 17 lacks conciseness, Article 6 PCT and PCT Guidelines, PCT/GL/Part II/Chapter 5, 5.13-5.14, 5.42, because all the features of independent claim 17 (apparatus) are of overlapping scope with features of independent claims 1 (telecommunications system), 11 (serving support node), 13 (radio network controller) and 14 (mobile user equipment), claims which also belong to the category apparatus.

   Due to this overlapping of features, it is not clear in which part of the network are these features embodied, thereby rendering independent claim 17 as a whole not clear, Article 6 PCT.

   Moreover, the interrelationship of the features of claim 17 (apparatus) with features of independent claims 1 (telecommunications system), 11 (serving support node), 13

(radio network controller) and 14 (mobile user equipment) is not clear, Article 6 PCT.

**Therefore, claim 17 is not allowable, Article 6 PCT.**

2. Independent claim 13 is not clear, Article 6 PCT, because the interrelationship of its features (radio network controller) with the features of claims 1 (telecommunications system), 11 (serving support node) and 14 (mobile user equipment) is not clear. In particular, from the wording of claim 13, the relationship between the 'radio access request data' and the 'context application request data' is not clear.

**Therefore, claim 13 is not allowable, Article 6 PCT.**

3. Claim 13( "is responsive to", lines 20 and 21) contains a mixture of both process and apparatus features contrary to the requirements of Article 6 PCT and the PCT Guidelines chapter 5, 5.12.

**Therefore, claim 13 is not allowable, Article 6 PCT and the PCT Guidelines chapter 5, 5.12.**

4. The term "for" used in claims 1, 11, 13, 14 and 17 as e.g. in "a radio resource layer for controlling radio resources" (claim 13) has no limiting character to the related feature and leaves the reader in doubt as to whether e.g. the radio resource layer is **adapted to** control radio resources or is merely **suitable for** controlling radio resources. Therefore, the definition of the subject-matter of said claims is unclear, Article 6 PCT.

**Consequently, claims 1, 11, 13, 14 and 17 are not allowable, Article 6 PCT.**

5. The wordings "is **operable to**" or "being **operable to**" used in claims 1 to 3, 6, 11, 12, 14 and 15, are vague and unclear and leave the reader in doubt as to the meaning of the technical features to which they refer, thereby rendering the definition of the subject-matter of said claims unclear, Article 6 PCT.

**Therefore, claims 1 to 3, 6, 11, 12, 14 and 15 are not allowable, Article 6 PCT.**

supported, depending upon for example current loading of the network. As such, it is desirable to use the radio resources as efficiently as possible.

European patent EP 1 096 742 A discloses a radio network which is adapted to support the communication of multi-media data to and from a mobile user equipment. The multi-media data may include a plurality of different data types from different data sources. A multi-service Packet Data Protocol (PDP) context is disclosed for use in subscribing to one or more PDP addresses for each data source. The multi-service PDP context is therefore generated for a subscription request for more than one Quality of Service class. Therefore a bearer can be established having a Quality of Service which is appropriate for communicating the data from one of the data sources to and from the mobile user equipment.

International patent application number WO 02/098077A discloses a mobile radio communications network which is arranged to communicate different classes of data bits from the pay load of IP packets over a radio interface. Each data frame which contains the different classes is divided, in either an application layer or in a lower IP layer, into smaller payload fragments, each of the smaller payload fragments containing a different one of the classes of data. The application layer or the IP layer then generates IP packets along with corresponding treatment information. Each IP packet contains a different one of the classes of data bits for transport over the packet radio network. A radio access bearer is established for each IP packet, the bearer having a Quality of Service which can be matched to the class of data provided in the payload.

**Summary of Invention**

A telecommunications system for providing a facility for communicating internet packets to and/or from a mobile user equipment, payload data of the internet packets comprising a plurality of different types of data, the system comprising a packet radio network which includes a gateway support node, a serving support node and a radio network controller,

the gateway support node being operable to provide an interface for communicating the internet packets between the user equipment and the packet data network,

the serving support node being operable to control communication of the internet packets between the gateway support node and the mobile user equipment using a radio network controller, the radio network controller being operable to provide radio access bearers for communicating the internet packets to and from the user equipment, wherein

the gateway support node in combination with the serving support node are operable in response to context application request data from the mobile user equipment to establish a virtual communications channel between the gateway support node and the mobile user equipment via the serving support node, the context application request data representing a request for the virtual communications channel for communicating the internet packets containing the different types of data, the context application request data specifying a main set of quality of service parameters and including at least one other data field representing a request for a different set of quality of service parameters, each set of quality of service parameters being provided for one of the different types of data in the internet packet, the virtual communications channel including a bearer for communicating the internet packets between the gateway support node and the serving support node and a plurality of radio access bearers, each of the radio access bearers being provided for one of the different types of payload data of the internet packets, each radio access bearer providing one of the main and other set of quality of service parameters for the different data types specified by the context application request data.

Known systems, which provide a particular quality-of-service (QoS), can be inflexible in that they set up a radio bearer to transmit the entire payload of a data

packet in accordance with the same quality of service parameters. This may not make efficient use of radio resources when the data packet payload includes different data types which may have different QoS requirements and/or may be of unequal importance.

Embodiments of the present invention can provide a radio access bearer for supporting different types of data within a data packet such as an internet protocol data packet. A radio access bearer is provided for each data type. The quality of service parameters supported by each radio access bearer can be adapted to the characteristics and/or importance of each different data type. As such, radio resources provided by the network can be used more efficiently.

In some embodiments the radio access bearer for each different data type is provided as a sub-flow within a main radio access bearer according to a main set of quality of service parameters. Accordingly, little or no substantial changes are required to a radio network controller which has been developed for an existing network architecture such as for example the GPRS.

Various further aspects and features of the present inventions are defined in the appended claims and include a method for communicating internet packets carrying a plurality of different types of data, a serving support node, a radio network controller and a mobile user equipment.

supplied access point name information to determine the address of at least one GGSN 300 that will provide the required connectivity to the external network. The IP address of the selected GGSN 300 is supplied to the SGSN 306. At stage 518 the SGSN uses the supplied GGSN IP address to request a virtual connection channel to the GGSN 300 using a GPRS tunnelling protocol. At stage 520, the GGSN associates the tunnel with the external network connection. A connection Tunnel is a predefined virtual channel across which encapsulated user data can be transmitted. At stage 522 the GGSN receives the connection tunnel request and establishes the requested tunnel and returns an IP address to be conveyed to the UE 352. Accordingly a virtual connection is established between the UE 352 and the GGSN 300. The GGSN 300 has a further association between the connection tunnel and the physical interface to the external network. Accordingly, data transfer is enabled between the UE 352 and the external network.

Figure 8 is a flow chart that schematically illustrates the control plane negotiations between the SGSN 306 and the RNC 314 for the allocation of radio resources according to distinct QoS requirements for the A-bits, B-bits and C-bits of the voice data. At stage 530, on receipt of the PDP context information element specifying three independent sets of QoS parameters for the A, B and C bits respectively, the SGSN 306 sends a RANAP request to the RNC 314 requesting the set-up of a Radio Access Bearer for the data transfer requested by the user application. At stage 532 the Radio Resource Control Layer 422 of the RNC 314 receives the RANAP request and passes the request to the Media Access Control layer 426. At stage 534 the MAC layer established three independent RAB sub-flows for the A-bits, the B-bits and the C-bits respectively. Each sub-flow has a predefined. The category of sub-flow selected is specified by the RANAP for each of the three voice categories. Finally at stage 536 the physical layer parameters are separately configured for each of the three sub-flows. In particular a different level of error protection is applied to each of the three sub-flows.

To support unequal error protection (i.e. different levels of error protection for different classes of voice data bits) a number of QoS parameters should be separately configured for each class of voice bits (A-bits, B-bits and C-bits). The RAB assignment procedure is initiated by the SGSN 306 based on information in the PDP context request. The RNC 314 then establishes the UMTS radio access bearers

determine in which order to discard datagrams in the event of network congestion. A total length field 278 specifies the total length of the IP datagram (i.e. header plus payload) in octets. The maximum possible length of a datagram is $2^{16}$ bytes. An identification field 280 contains an incrementing sequenced-number assigned to IP datagrams by the source IP. A flags field 282 indicates fragmentation possibilities for the data. A "don't fragment" (DF) flag specifies whether or not fragmentation is allowed. A more fragments (MF) flag signifies that the associated datagam is a fragment. When MF=0 either no more fragments exist or the data was never fragmented. A fragment offset field 284 is a numerical value assigned to each successive fragment that is used at the IP destination to reassemble the received fragments in the correct order. A time to live field indicates the amount of time either in seconds or in router hops that the IP datagram can survive before being discarded. On passage through the network, each router examines and decrements this field e.g. by the number of seconds that the datagram is delayed inside the router. The datagram is discarded when this field reaches a value of zero. A protocol field 288 holds the protocol address to which IP should deliver the data payload: a protocol address of 1 corresponds to Internet Control Message Protocol (ICMP); a protocol address of 6 corresponds to Transmission Control Protocol (TCP): and a protocol address of 17 corresponds to User Datagram Protocol (UDP). A header checksum field 290 contains a 16-bit value used to verify the validity of the header. The header checksum value is recomputed in every router as the time to live field 286 decrements. Checks are not performed on the user data stream. A source IP address field 292 is used by the destination IP to send a response to the source IP. A destination IP address field 294 is used by the destination IP to verify that it has been delivered to the correct destination. The IP data payload field 296 contains a variable amount of data, possibly thousands of bytes, destined for delivery to TCP or UDP.

## CLAIMS

1. A telecommunications system for providing a facility for communicating internet packets to and/or from a mobile user equipment, payload data of the internet packets comprising a plurality of different types of data, the system comprising a packet radio network which includes a gateway support node, a serving support node and a radio network controller,

the gateway support node being operable to provide an interface for communicating the internet packets between the user equipment and the packet data network,

the serving support node being operable to control communication of the internet packets between the gateway support node and the mobile user equipment using a radio network controller, the radio network controller being operable to provide radio access bearers for communicating the internet packets to and from the user equipment, wherein

the gateway support node in combination with the serving support node are operable in response to context application request data from the mobile user equipment to establish a virtual communications channel between the gateway support node and the mobile user equipment via the serving support node, the context application request data representing a request for the virtual communications channel for communicating the internet packets containing the different types of data, the context application request data specifying a main set of quality of service parameters and including at least one other data field representing a request for a different set of quality of service parameters, each set of quality of service parameters being provided for one of the different types of data in the internet packet, the virtual communications channel including a bearer for communicating the internet packets between the gateway support node and the serving support node and a plurality of radio access bearers, each of the radio access bearers being provided for one of the different types of payload data of the internet packets, each radio access bearer providing one of the main and other set of quality of service parameters for the different data types specified by the context application request data.

2. A telecommunications system as claimed in Claim 1, wherein the serving support node is operable in response to the virtual communications channel being established

to communicate radio access request data in accordance with a radio access network application part protocol to the radio network controller, and the radio network controller is operable in combination with a radio resource control layer to establish using a medium access control layer one of the radio access bearers for each of the plurality of quality of service parameters specified for the different data type.

3. A telecommunications system as claimed in Claim 2, wherein the radio resource control layer is operable

to establish the radio access bearers as a main radio access bearer in accordance with the main quality of service parameters in the medium access control layer, and

to establish the radio access bearer for each of the different data types as a sub flow within the main radio access bearer in the medium access control layer.

4. A telecommunications system as claimed in any preceding Claim, wherein the payload data of the internet packets includes a frame of data formed from an adaptive multi-rate speech codec, the data frame providing the plurality of the different types of data.

5. A telecommunications system as claimed in any preceding Claims, wherein the mobile user equipment is operable to communicate the context application request data to the gateway support node in accordance with a Packet Data Protocol context activation procedure.

6. A method of communicating internet packet data to and/or from a mobile user equipment via a packet radio network, payload data of each internet packet comprising a plurality of different types of data, the packet radio network including a gateway support node, a serving support node and a radio network controller the method comprising

using the serving support node of the packet radio network to control communication of the internet packets between the gateway support node and the mobile user equipment using the radio network controller, the radio network controller being operable to provide radio access bearers for communicating the internet packets to and from the user equipment,

communicating context application request data to the gateway support node, the context request data representing a request for a virtual communications channel for communicating the internet packets containing the different types of data via the packet radio network, the context application request data including a data field specifying a main set of quality of service parameters and including at least one other data field representing a request for a different set of quality of service parameters, each of the sets of quality of service parameters being provided for one of the different types of data in the internet packets, and

establishing the virtual communications channel between the gateway support node and the user equipment in response to the context application request data for communicating the internet packet data,

including establishing a plurality of radio access bearer in accordance with each of the sets of the quality of service parameters, each radio access bearer being provided for communicating one of the plurality of different types of payload data of the internet data packets.

7. A method as claimed in Claim 6, the establishing the virtual channel comprises

communicating radio access request data in accordance with a radio access network application part protocol to the radio network controller, and

using a medium access control layer of the radio network controller to establish the radio access bearer for each of the plurality of quality of service parameters for one of the different data types.

8. A method as claimed in Claim 7, wherein the using the medium access control layer comprises

establishing a main radio access bearer in accordance with the main quality of service parameters in the medium access control layer, and

establishing the radio access bearer for each of the different data types as a sub-flow within the main radio access bearer in the medium access control layer.

9. A method as claimed in Claim 6, 7 or 8, wherein the payload data of the internet packets includes a frame of data formed from an adaptive multi-rate speech coded, the data frame providing the plurality of the different types of data.

10. A method as claimed in any of Claims 6 to 9, wherein the context application request data is communicated in accordance with a Packet Data Protocol context activation procedure.

11. A serving support node of a packet radio network for communicating internet packets to and/or from a mobile user equipment, the internet packets including a header and payload data, wherein the payload data includes a plurality of different types of data, the serving support node comprising

an internet protocol communications layer and

a user data tunnelling layer operable to provide a virtual communications channel for communicating user data between the mobile user equipment and a gateway support node of the packet radio network, wherein the serving support node is operable in combination with the gateway support node to response to context application request data from the mobile user equipment

to establish the virtual communications channel between the gateway support node and the user equipment via the serving support node for communicating the internet packets, and

in response to the context application request data including a data field representing main set of quality of service parameters and at least one other data field representing a request for a different set of quality of service parameters, each set of quality of service parameters being required for one of the different types of data in the internet packets,

to establish a plurality of radio access bearers each in accordance with one of the sets of the quality of service parameters, each radio access bearer being provided for one of the different types of payload data of the internet packets.

12. A serving support node as claimed in Claim 11, the serving support node comprising

a radio access network application part protocol layer, wherein the serving support node is operable in response to the virtual channel being established through the user data tunnelling layer,

to communicate radio access request data using the radio access network application protocol layer to a radio network controller to establish using a medium access control layer of the radio network controller a radio access bearer for each of the different types of data in accordance with a respective set of quality of service parameters.

13. A radio network controller of a packet radio network for communicating internet packets between a serving support node and a mobile communications user equipment, payload data of each of the internet packets comprising a plurality of different types of data, the radio network controller comprising

a radio resource layer for controlling radio resources for communicating the internet packets,

a radio link control layer for controlling a medium access control layer to provide radio access bearers for communicating the internet packets via a radio access interface to the mobile user equipment, the radio link control layer providing the radio resources controlled by the radio resource layer, wherein the radio resource layer is responsive to a radio access request data using a radio access network application protocol layer to control the radio link control layer to establish using the medium access control layer a main radio access bearer for one of the different types of data in accordance with a main set of quality of service parameters, and

to establish a radio access barer for each of the different data types as a sub-flow within the main radio access bearer in the medium access control layer.

14. A mobile user equipment for communicating internet packets, payload data of each of the internet packets data comprising a plurality of different types of data, the user equipment being operable to communicate context application request data to a serving support node of a packet radio network, the context request data

representing a request for a virtual communications channel for communicating the internet data packets containing the different types of data, wherein the request data includes a data field specifying a main set of quality of service parameters and at least one other data field representing a request for at least one other radio access bearer providing a different quality of service parameters, each of the radio access bearers being provided for one of the different types of data in the payload of the internet packets.

15. A computer program providing computer executable instructions, which when loaded on to a data processor configures the data processor to perform a method for communicating internet packets to and/or from a mobile user equipment via a packet radio network, payload data of each of the internet packets comprising a plurality of different types of data, the packet radio network including a gateway support node, a serving support node and a radio network controller the method comprising

controlling communication of the internet packets between the gateway support node and the mobile user equipment using the radio network controller, the radio network controller being operable to provide radio access bearers for communicating the internet packets to and from the user equipment,

communicating context application request data to the gateway support node, the context application request data representing a request for a virtual communications channel for communicating the internet packets containing the different types of data between the gateway support node and the mobile user equipment, the context application request data including a data field specifying a main set of quality of service parameters and at least one other data field representing a request for a respective set of quality of service parameters, each of the sets of quality of service parameters being provided for one of the different types of data in the internet packets, and

establishing the virtual communications channel in response to the context application request data, including establishing a radio access bearer for each of the sets of quality of service parameters for communicating the different types of payload data in the internet packets.

16. A computer program as claimed in Claim 15 embodied on a computer readable medium.

17. An apparatus for communicating internet packet data to and/or from a mobile user equipment via a gateway support node, the internet packet data carrying a plurality of different types of data, the apparatus comprising

means for communicating the data packets between to the user equipment and the gateway support node,

means for controlling communication of the data packets between the mobile user equipment using a radio network controller, the radio network controller being operable to provide radio access bearers for communicating the internet data packets to and from the user equipment,

means for communicating context application request data to the gateway support node, the context application request data representing a request for a virtual communications channel for communicating the data packets containing the different types of data, the context application request data including a data field specifying a main set of quality of service parameters and at least one other data field representing a request for a different set of quality of service parameters, each of the sets of quality of service parameters being provided for one of the different types of data in the data packet, and

means for establishing the virtual communications channel between the gateway support node and the mobile user equipment in response to the context application request data,

including establishing a radio access bearer in accordance with each of the sets of quality of service parameters for communicating the different data types.

18. A telecommunications system, a gateway support node, a serving support node, a radio network controller or a mobile user equipment substantially as herein before described with reference to the accompanying drawings.

19. A method for communicating internet packet data substantially as herein before described with reference to the accompanying drawings.

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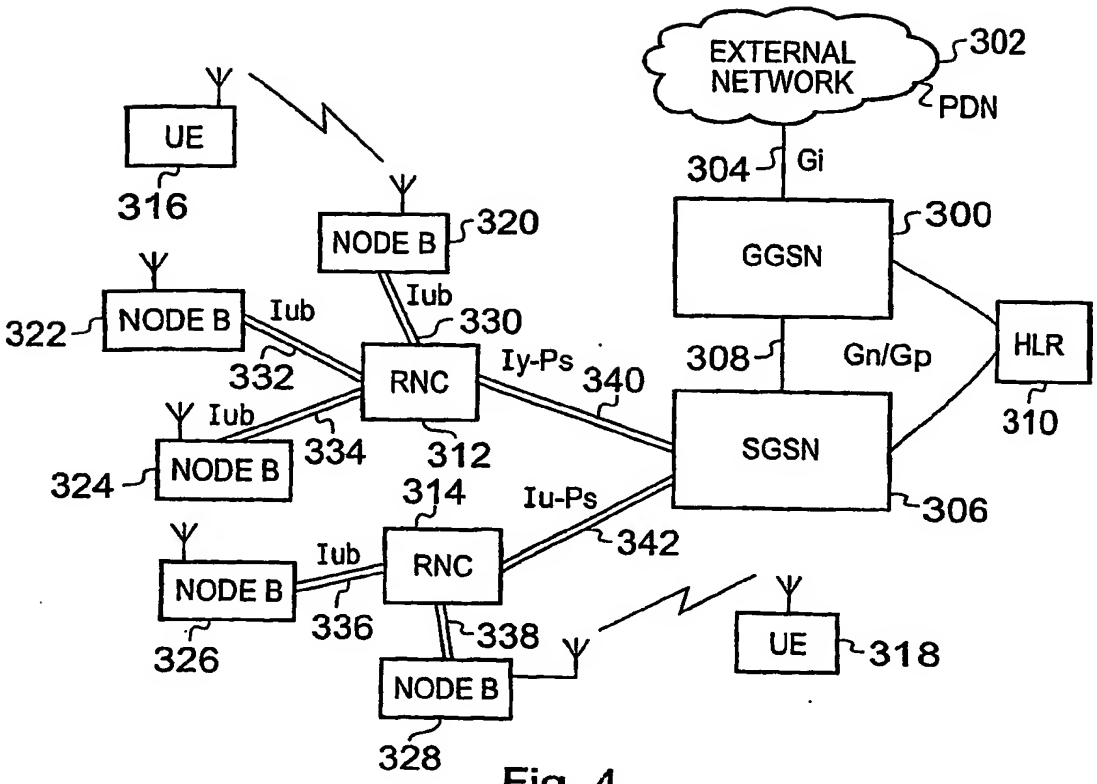



Fig. 4

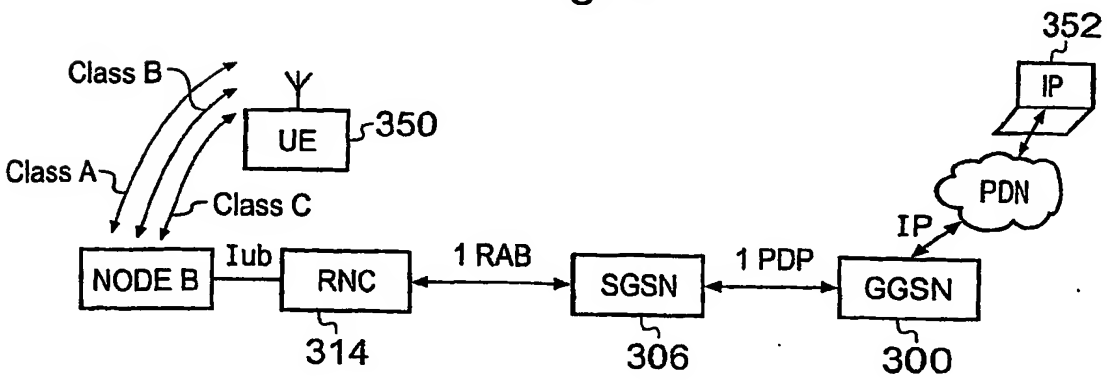
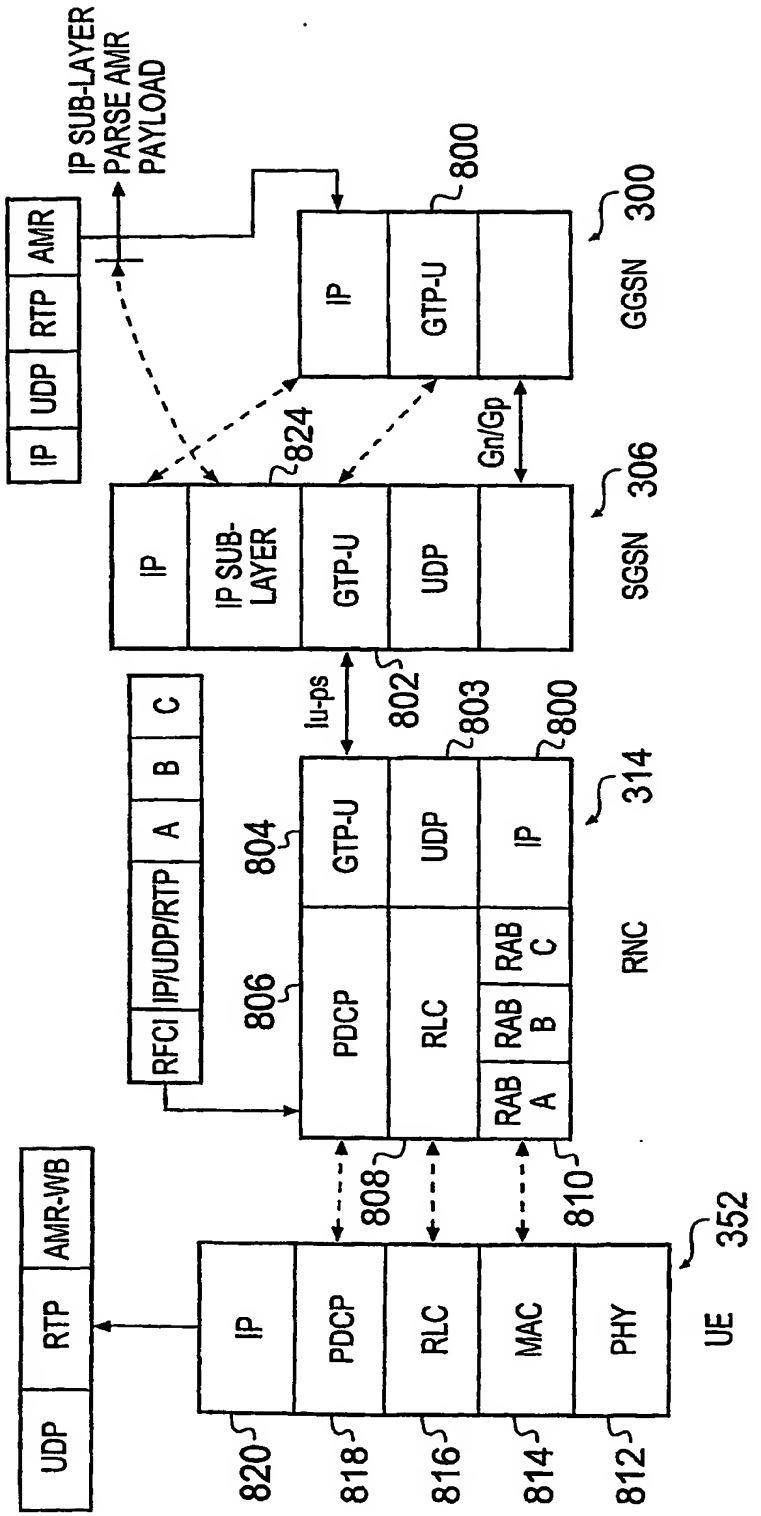



Fig. 5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GTP-U
UDP
SGSN
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Iu-ps
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800
804
806
RFCI
IP/UDP/RTP
A
B
C
GTP-U
UDP
IP
PDCP
RLC
RAB A
RAB B
RAB C
RNC
314
808
810
UDP
RTP
AMR-WB
IP
PDCP
RLC
MAC
PHY
UE
352
820
818
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814
812

Fig. 14